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ELECTRIC POWER AND POWER EQUIPMENT

LENINGRAD ELECTRIC POWER STATION

Leningrad LENINGRADSKAYA PRAVDA in Russian 7 Nov 79 p 3

[Article: "The Leningrad AES Power Engineers: for October"]

[Text] Sosnovyy Bor, 6 November. (Leningrad TASS Correspondant). Hot jets of steam from the depths of third nuclear boiler of the Leningrad Nuclear Electric Power Station imeni V.I. Lenin today struck the blades of the turbines. The five hundred meter span turbine room of the station was filled with the smooth hum of the running units. The engineers, scientists and specialists who brought the turbines up to the nominal r.m.p. ahead of schedule began the check of the physical parameters and indicators of the mechanical operation of the new power unit of the station. With this start, the capacity of the Leningrad AES will attain three million kilowatts.

This success is the result of socialist competition to place the second stage of the nuclear giant near Leningrad on-line, and was also provided in the resolutions of the 25th CPSU Congress. The self-sacrificing labor of the builders, installation workers and operators has made it possible to significantly accelerate the start-up debugging work, as compared to placing the first unit of the station in service.

In competing to meet the 110th Anniversary of the Birth of V.I. Lenin in a worthy manner, the collectives of the station, which numbers among the leading Leningrad enterprises bearing the name of the leader of the revolution, came out with a call to honor the glorious jubilee with new labor gifts. It promised to generate 2.5 billion kilowatt-hours of electrical power above the plan. The third block of the station, the most powerful nuclear electrical plant in the USSR and Europe, will also be an important tributary feeding this electrical river.

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ELECTRIC POWER AND POWER EQUIPMENT

COMPLAINTS OF PLAN UNDERFULFILLMENT IN ELECTRIC POWER EQUIPMENT INDUSTRY

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 28 Sep 79 p 2

[Article by M. Zalipayev, Melter Foreman, Member of the Party Committee of the Production Association for Heavy Crane Construction imeni the January Uprising, Hero of Socialist Labor, Odessa: "Education Begins with Order: A Stumbling Block for a Partner"]

[Text] The Dmitrovskiy lathe operator A. Kryakov, advanced a justified and timely idea in his article: "Order in production, order in the sector, and order in the intersectoral business relationships come ahead of everything. So let's guide it . . .". It was correctly underscored at: order should be everywhere, all of the interrelated links of our common business life should be equally strong and reliable. When even one link is weakened . . . what happens then, I shall show using an example from the life of our enterprise.

The association in which I work makes hoisting cranes. They are quite necessary to all builders, but we are not yet completely meeting the demand. For this reason, it is especially important for the collective to work at a regular tempo, and deliver the mechanisms strictly in accordance with the schedule, for every day of delay means that somewhere the stories of new construction projects do not go up on time. But for the association, the normal work tempo is at times being disrupted. The supply of component parts is being disrupted. And I mean disrupted! On the 24th of June, for example, some 29 25-ton hoist cranes were standing in the plant yard almost ready for shipment. It was painful to look at them - the first day, then another, then the third, the fourth . . . The boards of directors were besieged by the representatives of the customers, they waved documents, asked that "a way be found" and threatened justified penalties. . . But could we say to them in reply? The machines were almost ready - only there were not enough generators from the Prokop'yevsk "Elektromashina" plant and electric motors from the Riga electrical machine construction plant. We promised to "think of something", "somehow resolve the problem", and we managed as we could. The suppliers these days have worn their legs out looking for the missing parts: they have entered into direct contacts with other plants, and gotten several motors at the base for the Black Sea

Maritime Fleet: the process engineers decided how these assemblies, not provided for in the blueprints, were to be mounted on the machine and what "refinements" were needed for this in the design of the cranes . . . We led an abnormal life those days. And really just during those days? Individual interruptions in any business cannot be taken into account: there are all kinds in life. The unfortunate thing is that a situation, similar to the one in June, has become typical in the work of the association, and disruptions of deliveries both from Prokop'yevsk and from Riga have become systematic in our business relationships. Over the first half of the present year, the Riga plant failed to deliver to us no fewer than 199 electrical machines, and the Prokop'yevsk, somewhat more: 356. As a result, we made 120 hoisting cranes under explicitly abnormal work conditions; in order the meet the assignment, numerous telephone calls, telegrams, business trips, . . . were required. To this day, the association is forced to systematically send people to factories producing parts for other factories, while the products are shipped from there by air. This, understandably, produces considerable additional expenses, in particular, eats up almost half of our bonus funds. People justifiedly ask the question: why should we suffer because of the inadequate work of others?

The association is attempting to set up closer contacts with production partners. I recall that representatives of 15 related plants were invited to Odessa, and we ourselves travelled to Riga. During the meetings, we made promises to each other, and signed socialist agreements. After this, relationships with some enterprises improved markedly, but not with all of them: both the Prokop'yevsk and the Riga to this day continue to violate their agreed obligations.

Why is this possible? Why have both our telegrams to the VPO [All-Union Production Association], to which these plants are subordinated, and letters personally sent to the minister of the electrical engineering industry, Aleksey Konstantinovich Antonov, in which we requested that agreed for us, remained essentially unanswered? Is this not the typical example of disorder - in this case, disorder at the sectoral level and disorder in the intersectoral relationships?

Recently, we arrived in Moscow with these questions along with our electrical drive bureau chief B. Timofeyev. At first, we went to our "Soyuzekskavator" VPO. There they listened to us attentively, expressed sympathy, after which we have already made three trips to the material and technical supply administration of the Ministry of Road Machine Construction. Here a number of steps were taken which should assist in the affair: first of all, they called the Kemerovo oblast party committee, and secondly, they called the chief of the Soyuzelektroagregat" VTO, S. Leont'yevskiy, who promised to immediately get a telegram off to Prokop'yevsk. We saw the considerable concern on the part of these comreades for the situation which has arisen with the electrical machines. Only then the following thoughts come up in this regard.

Why did they not know about the insufficient deliveries of electrical machines to us in the "Soyuzelektroagregat" VPO and the Ministry of Electrical Engineering Industry? Is that we came and told the respected comrades something new? No, of course not. But then it is not understandable why the production association should extend so much energy to provide itself which is already funded for us? For you see, this is primarily the affair of the ministerial workers - those of them who are paid specifically to see that the generators from Prokop'yevsk arive in Odessa on time. How can these workers, knowing that we were not delivered the slightly more than hoalf a thousand electrical machines, be quietly reconciled to this? How can they not knock on all doors until the problem is resolved? What can be expected when we arrive and ask them to call, to send letters and telegrams? They do understand that in fact, a crane without a generator will not roll out of the shop. Here, in my opinion, is one of the sources of disorder: the responsible people are doing a poor job of carrying out their service obligations, and for some reason they get away with it.

We recently read a decree of the CPSU Central Committee and the USSR Council of Ministers, "On Improving the Planning and Strengthening the Effect of the Management Mechanism in Raising Production Efficiency and Work Quality." It is indicated in the decree that one of the main indicators for the work of an enterprise becomes the fulfillment of obligations for deliveries of products in accordance with concluded agreements. It is thought that it will force the managers of the sectors to take a more serious approach than at the present to both the drawing up of the plans and to their material and technical support. In any case, things should not be as they are now. The unreliable business ties between related enterprises at times disrupt production order and pacing, something which incurs not only economic losses, but this also reduces the good state of mind of the collective, has an effect on labor discipline and complicates the educational work.

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ELECTRIC POWER AND POWER EQUIPMENT

PREPARATIONS OF HEAT AND ELECTRIC POWER STATIONS FOR WINTER

Moscow PRAVDA in Russian 21 Oct 79 p 2

[Article by Nikolay Petrov: "One Hundreds Lines from the Economist: at the Threshold of Winter"]

[Text] In September, the builders constructing the Lipetskaya Magnitka cold rolling shop were carefully watching how things were going in the span for the cover furnaces. Here, they were faced with installing a multiplicity of wall panels, rotating panels and window sashes in a short time. The realization of the plans and obligations for the cold season of the year depended on the timely execution of these operations. They succeeded! And even ahead of schedule. They did not let down the brigade comrades, heros of socialist labor, Mikhail Ivanovich Merkulov, Aleksandr Grigor'yevich Aparina and Vasiliy Mikhaylovich Krasnikov. . ..

The past December and January, which were memorable for their freezing weather, taught a severe lesson. Tens of collectives did not meet the monthly and quarterly plans because of the fact that the rooms were not heated, the heating lines and the electrical networks were not repaired, and reliable insurance reserves of fuel and raw materials were not created. And here is a new winter on the threshold. Is everyone ready for it? Alas, the alarm signals coming in to PRAVDA tell the following: in a number of places, last year's disorders and their consequences can be repeated. Here are a few reports.

Ust'-Ilimsk. Only half of the requisite amount of fuel has been stored as yet at the local TETs. The situation is similar at a number of other heat and power stations in the Irkutsk oblast. Here, the schedules for the repair of the equipment were interrupted during the year and the coal dumps were not brought in on time.

Kostroma. Of the hundred measures to prepare for winter, only about 25 have been completely implemented at the housing construction combine.

Dzhambul. The city soviet executive committee ordered all users of steam and hot water produced at the TETs-4 to check the heating mains and

eliminate defects by September 1st. But by October 1st, only about 650 of the almost 1,000 clients had implemented the decision.

Various cities, enterprises, . . . And the reasons for the disruptions are also diverse. But the main one is the lack of efficiency manifest by some managers on the sites. The attitude towards the preliminary winter efforts is clearly seen as towards something secondary, something which can be put off "till later". Many, as can be seen, hope that the winter will not be too severe, as they say, "it will fly by" . . ..

And if it does not fly by? Isn't it more reliable to figure on the worst: a cold winter and hard freezes. Only in this way can the plan and obligations be secured against disruptions. The party committees are obligated to be uncompromisingly exacting towards the communists-managers of the subdivisions responsible for preparing for winter. And the main thing is that it is necessary everywhere, where this is needed, to urgently correct the situation, and achieve 100 percent confidence in the fact that the cold will not bring unpleasant surprises and production losses. Here, no small amount can be done by the people's controllers - it is specifically they who must take charge of the mass special assignments to check the winter preparations. All of this will assist the collectives in carrying out the plans and obligations for this year, and reliably start the last year of the five-year plan.

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ELECTRIC POWER AND POWER EQUIPMENT

EKIBASTUZ STATE REGIONAL ELECTRIC POWER STATION DELAYS

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 19 Oct 79 p 3

[Article by B. Glotov: "The Ekibastuz GRES-1"]

[Text] A few weeks ago at the construction site of the Ekibastuz GRES-1, it was necessary to take down a sign calling on the collective to place the first power unit of the station with a capacity of 500,000 kilowatt-hours in service on September 25. The builders of the Ekibastuzenergostroy General Contracting Trust did not fulfull the major point of their socialist obligations. The deadline for the start had to be postponed.

Why then did the facility not go on-line at the designated time? They began to construct the station four years ago in the bare steppes, without reliable and firm rear services. It was necessary to start the construction of their own production base and housing, and here they first started to construct the industrial facilities. For this reason, difficulties immediately arose in supplying the power builders with the requisite materials. The poorly paced supply has up to now given the work of the collective a feverish air. Housing and children's facilities have gone up slowly here and in a small amount. And for this reason the construction project is chronically short of people.

Because of the lack of high capacity reliable rear services, the pace of the construction has been slow. They really started to construct the station only in the last year. But for some reason, only one building has basically been constructed.

"We wanted to finish the major work more quickly," said the director of the Ekibastuzenergostroy Trust, E. Filatov, "And then shifts the personnel over to the construction of the auxiliary facilities."

However, the power builders have been "tied down" for a long time in the main building of the electric power station. The time for the start approach, and they just barely manage to finish work on this object alone, and did not get to the auxiliary unit. And here the work has not been underway for a month yet.

This year, the builders and installation workers were supposed to place two power units with a capacity of one million kilowatt-hours on-line. It is now already clear that they will able to start only one of them. That is, they will provide the nation's power system with 500,000 kilowatt-hours less of electrical power than was planned.

ELECTRIC POWER AND POWER EQUIPMENT

BRIEFS

YENISEY POWER GIANT --Sayanogorsk--Giants on the Yenisey. The second hydroelectric unit of the Sayano-Shushenskaya GES was placed under industrial load on the evening of November 5. Its power flowed into the nation's unified power system. The following was written in the socialist obligations of the collectives of hydroelectric builders: start the second unit of the station by the 62nd anniversary of the Great October Revolution. The shock labor of the installation workers, concrete workers and machine operators went foreward under this slogan. The path of the hydroelectric builders to this joyful day was not easy. The summer flooding on the Yenisey placed the construction project under very difficult conditions: it was necessary to cut an unplanned transport tunnel through the rock faces of the right bank, and to reset the giant cranes with which the concrete was poured. As soon as the flooding went down, better brigades arrived at the site of the second unit: concrete workers headed by Poznyakov and installation workers of brigade leader V. Demidenko. The work was difficult, and mutual assistance and coordination helped. At that time, the concrete pouring shifts speeded up the growth rate of the dam: you see, for the operation of the two units, it was necessary to accumulate the requisite amount of water. And now the second heart of the Sayano-Shushenskaya GES is beating. The power of the Yenisey giant is going to the consumers. And next on the schedule is the third unit. It is planned to go into service at the end of the year [Text] [Moscow IZVESTIYA in Russian 7 Nov 79 p 6] 8225

KOSTROMSKAYA GRES--The Equipment Arrives. The stators of the largest generator in the nation with a capacity of 1,200,000 kilowatts has been delivered to the construction site of the Kostromskaya GRES from Leningrad. The weight of the load is 490 tons. The thousand kilometer trip was completed successfully. In the coming days, the GRES builders will install the gigantic stator on the foundation in the main building of the electric power station. [Text] [Moscow STROITEL'NAYA GAZETA in Russian 28 Oct 79 p1] 8225

SAYANO-SHUSHENSKAYA GES--Sayanogorsk--The Second Unit Is Next. The hydroelectric builders are preparing the start of the second unit of the Sayano-Shushenskaya GES for the Great October holiday. The height of one of the units, for which the concrete work has just been finished by the Komsomol Youth Brigade of M. Mashchenko, reached 125 meters. This is higher than the crest of the Bratskaya and Krasnoyarskaya GES dams. The Sayano-Shushenskaya hydroelectric builders have arrived at just a unique "equator" - the design height of the dam in the Karlov branch of the Yenisey will reach the 240 meter mark, while its volume will amount to almost 10 million cubic meters of concrete. The level of the water reservoir of the Sayano-Shushenskaya GES is growing along with the dam. [Text] [Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 1 Nov 79 p 1] 8225

POWER TRANSFORMER PRODUCTION--Zaporozh'ye--For the Power Engineering Construction Projects. The "Zaporozhtransformator" production association has started the production of three-stage 330 kilovolt transformers designed for powering electrical measurement instruments, and protection and signalling circuits. Standardized assemblies are used in the design, something which has reduced the weight of the products by almost 30 kilograms and curtailed the time required to place them in production. The first batches of the "NKF-330" will be sent to the construction sites for the Vyborgskaya substation and the Chernobyl'skaya and Kol'skaya Nuclear Electric Power Stations. Series production of 66, 132 and 220 kilovolt transformers is next. [Text] [Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 1 Nov 79 p 2] 8225

EKIBASTUZGRES-1--Ekibastuz, Pavlodarskaya Oblast--A 'Refrigator' for the GRES. It is difficult to imagine a refrigator which takes up almost 20 square kilometers. But the cooling reservoir for the Ekibastuz GRES-1 will be just this. "On the advice of scientists, the bitter salt lake of Zhangel'da was selected as the 'refrigator'," related academician of the Kazakh SSR Academy of Sciences, Sh. Chokin to TASS correspondant B. Iskakov. The lake basin was flushed of salts and dirts several times beforehand, and thereafter, began to fill with water by means of a special water engineering system. The lake will contain about 90 million cubic meters. This quantity is sufficient for stable operation of all eight power units of the station with a capacity of 500,000 kilowatts each. [Text] [Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 4 Nov 79 p 2] 8225

ROVENSKAYA AES--Rovenskaya Oblast--The Reactor Vessel Has Been Installed. These are prestart days at the Rovenskaya AES. The first reactor should generate power at the end of this year. Its vessel has now already been installed in the shaft. The responsible and meritorious work was performed by the specialists of a section of the "Yuzhteploenergomontazh" trust, who constructed the reactor section in a short time, pouring 400,000 cubic meters of concrete and installing 14,000 cubic meters of prefabricated concrete [Text] [Kiev PRAVDA UKRAINY in Russian 16 Oct 79 p 3] 8225

ELECTROCHEMICAL POWER ENGINEERING CONFERENCE--Moscow--Chemistry for Power Engineering. The work of the All-Union Scientific Conference on "Electrochemical Power Engineering" began yesterday in Moscow. Its participants will discuss the state of the art and prospects for the development of chemical power sources and methods of obtaining electrical power by means of chemistry. The range of application of chemical current sources runs from small batteries for pocket flashlights to fuel cells for spacecraft. About 10 billion units are produced annually throught the world, while the overall capacity of such cells and batteries is commensurate with the capacity of all of the electric power stations of the world. Thus, electrochemical power engineering is a significant portion of the world power engineering system. The problems of future power engineering number among the most important which face mankind. The reserves of traditional types of fuel are being exhausted and scientists must seek new sources of energy - powerful, ecologically clean and, desirably, inexhaustible. [Text] [Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 26 Sep 79 p 4] 8225

KOLYMSKAYA GES--Sinegor'ye, Magadanskaya Oblast--On Your Mark, Go! The start of an important step was recorded in the chronicle of the construction project by the explosions, which rumbled in the depth of the rock cliff of the left banks of the section line of the Kolymskaya GES. The drilling of two 100 meter tunnels has been started, through which the water of the powerful northern river will run at an enormous pressure to the hydroelectric units of the station. The collective of the underground complex has run a straight course to the finish line, which leads to the cherished marker: the start of the first unit of the station, planned for the coming year. [Text] [Moscow IZVESTIYA in Russian 13 Nov 79 p 1] 8225

SHEVCHENKO-KALAMKAS POWER LINE--Gur'yev--Ahead of Schedule. The 200 kilometer 220 kilovolt electrical power transmission line from Shevchenko to Karazhanbas to Kalamkas has arrived at the Buzacha Peninsula for the oil prospectors, having crossed the rocky ridge and salt marshes. Voltage was applied to it yesterday. The power transmission line will make it possible to speed up the exploitation of the liquid fuel deposits found on the peninsula. The operational holes are being drilled here ahead of schedule, and the oil pipelines are being run and housing is going up. [Text] [Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 26 Sep 79 p 4] 8225

AES WALL REINFORCEMENT--A New Method of Reinforcement. Afundamentally new protective shell developed by specialists for the control room has been used in the construction of Novovoronezhskaya AES (Patent numbers 537525, 548694, 560043, 560044, 577284 and 600084). In contrast to the orthagonal reinforcement configuration adopted in world practice, so-called helicoid (helical) reinforcement of the walls has been introduced here, which provides for a reduction in the number of reinforcement elements and outlays for prestressing. The new method has made it possible to prefabricate reinforced metal structures for units weighing up to 30 tons, as well as manage the installation of the supporting reinforcement frame at the full height of the vertical walls, and pour the concrete shell in a single wall slipforming procedure using sealing facings. The amount of metal used for the control room has been considerably reduced. [Text] [Moscow STROITEL'NAYA GAZETA in Russian 2 Nov 79 p 3] 8225

HIGH VOLTAGE POWER LINE--Zhdanovsk, Azerbaijan SSR--A New Power System. A new high voltage electrical power transmission line, which has gone into service in the Mil'skaya steppe, has made it possible to connect the following facilities in the Zhdanovsk rayon to the state power system: a multiple farm sheep breeding complex and a feed plant. Since the start of the five-year plan, more then 50 large complexes have been electrified in Azerbaijan, as well as dairy farms and poultry farms. [Text] [Moscow SEL'SKAYA ZHIZEN' in Russian 19 Oct 79 p 1] 8225

ROVENSKAYA NUCLEAR POWER STATION--Rovno--A New Nuclear City. Among the collectives building nuclear electric power stations are the "Avangard" builders of the Rovenskaya Power Engineering Giant. Since the start of the year, they have performed work above the plan in the amount of two million rubles. A million cubic meters of earth has been removed, 80,000 cubic meters of monolithic concrete has been poured and more than 10,000 tons of metal structures have been installed. The reactor room has been built, the special shaft has received the silvery "cigar" of the reactor. The installation of the technological piping is underway. In the turbine room, two turbines have taken up their position. The power units need a great deal of water, and for this reason, the builders have made an effort to erect the cooling tower as soon as possible. The likes of these have never been built anywhere: the cooling tower rises to a height of 150 meters, taking up more than 12,000 tons of prefabricated and monolithic concrete in its shell and a large amount of reinforcing steel. Some 100,000 cubic meters of water will be cooled in its belly every hour. The workers, technicians and engineers at the Rovenskaya AES construction project are working with elated animation in these preholiday days. The towers of the new high voltage electrical power transmission lines have already started from the AES to the south, in the direction of the lines of the power systems of the member nations of CEMA. [Text] [Moscow NEDEL'YA in Russian No 43, 22-28 Oct 79 p 1] 8225

MAYNSKAYA GES--Mayna, Krasnoyarsk Kray--Some 25 kilometers downstream from the Sayano-Shushenskaya GES in the old Siberian village of Mayna, the third station on the Yenisey is going up, the Maynskaya. The machine operators of "Krasnoyarskgesstroy" yesterday started the earth excavation on the right bank near the dam of the future GES. The "Sputnik" of the power giant has been assigned the role of a drainage regulator for the river. The 35 meter dam of the Maynskaya GES will form a water reservoir which is sufficient to calm the artificial floods. Below it, the level of the Yenisey will always be the same. It is proposed that several hydroelectric units with an overall capacity of 350,000 kilowatts be installed at the GES. [Text] [Moscow MOSKOVSKAYA PRAVDA in Russian 10 Oct 79 p 1] 8225

UST'-ILIMSK TETS--Ust'-Ilimsk, Irkutskaya Oblast. The state commission has accepted for operation the second power unit of the Ust'-Ilimskaya Central Heating and Electrical Power Plant with a capacity of 50,000 kikowatts on Sunday. The TETs which is under construction at Ust'-Ilima is intended for providing heat and electrical power to the Ust'-Ilimsk Timber Industry Complex, which is being built with the participation of the member nations of the CEMA, other enterprises and the young city in Taiga. [Text] [Moscow MOSKOVSKAYA PRAVDA in Russian 2 Oct 79 p 1] 8225

POWER TRANSMISSION LINE--Ordzhonikidze--Electrical power was fed yesterday to the most remote settlements of the Digora canyon. The high mountain builders of Severnaya Osetiya [Northern Osetia] ran the electrical power transmission line under difficult conditions, which intersects broken gorges. An important step in the electrification of the autonomous republic was completed on the eve of the Great October holiday: all of the kolkozes and sovkhozes were switched over to a centralized power supply. Before the end of the five-year plan, the builders are faced with running more than 300 kilometers of high voltage routes. [Text] [Moscow TRUD in Russian 4 Nov 79 p 1] 8225

VYG GES--Kamennyy Vor, Karel'skaya ASSR--Power From Small Fast Rivers. Two rivers with a lot of rapids, the Vyg and the Onda which runs into it, which topographers draw on far from all of the geographic maps, are driving the turbines of five hydroelectric stations, which supply power to a large sawmill operation in Belomorsk, and aluminum plant in Nadvoitsy and a cellulose and paper combine in Segezha. The cascade of Vyg GES's has been a constant participant in the USSR exhibition of national economic achievements for several in a row now, since each of the stations is a highly sophisticated enterprise. The complex processes are controlled by means of automation. [Text] [Moscow IZVESTIYA in Russian 30 Oct 79 p 3] 8225

CSO: 1822

RATIONAL USE OF FUEL RESOURCES STRESSED

Moscow PRAVDA in Russian 10 Nov 79 p 2

[Article by Vasiliy Parfenov: "Heat for the People"]

[Text] The resolution of the CPSU Central Committee and the USSR Council of Ministers on improvement of the planning and perfection of the economic mechanism speaks about the necessity of rational utilization of physical resources, of intensifying the regime of economizing, and eliminating losses in the national economy. This document foresees as a priority task the development of a complex program of fuel economy. What kind of measures will help to expend fuel resources thriftily?

The "Food" of Machines

When man lights a match, in his hands occurs the great sacrament of the release of chemical energy stored by the wood from the sun. Oil yields an especially great amount of heat energy upon burning. This is why this "food" of machines arouses the vital interest of state figures, politicians, military men and economists. Gigantic pipelines circle countries and continents with circulatory arteries. Mighty supertankers, having taken whole lakes of oil into their steel wombs, float along the oceans. Drilling towers, like artificial forests, grow up in the deserts, steppes and tundras, they step from the earth to the areas of the seas.

Oil is searched for, extracted, processed and transported over thousands of kilometers in essence in order to make use of the energy contained in it. And without ceremony it is burned in motors, in the furnaces of electric power plants, it is turned into different products at chemical plants.

The reserves of oil in the depths of the earth are not unlimited. According to the estimates of the Soviet scientist N.B. Vassoyevich, contained in the sedimentary rocks of our planet is 77 trillion tons of hydrocarbons. These are gigantic riches. But the bulk of them is in scattered form and therefore does not have industrial value. And it is also impossible fully

to extract large accumulations in the beds of rock. This means that the actual reserves are much smaller.

Still another feature of the oil is that its reserves are not located uniformly on the continents. It is no accident that in a number of countries, and particularly in the United States, alarmed voices are heard about the approach of the "oil famine." In the visible future this does not threaten us. But this is what we must keep in mind.

The more we expend energy and fuel, the more it is necessary to extract fuel. From year to year it becomes more expensive: oil and gas are being discovered farther and farther from the places of consumption--in the taiga and tundra, in arid deserts. On the other hand, the need for fuel is increasing. The total capacity of internal combustion engines here is several-fold greater than the capacity of all the electric power plants. Last year Soviet industry produced 2,727,000 motor vehicles and tractors. In one year buyers acquired over 2 million passenger cars, motorcycles and motor scooters. They must be filled regularly with fuel and lubricating oil.

As the proprietors of national riches we are striving to expend fuel and heat more and more thriftily. The struggle for economy has been expertly organized at plants and in the tractor fleets of Moscow. In the past year alone the motor vehicle combines of Glavmosavtotrans [Main Administration of Motor Vehicle Transport of the Moscow City Executive Committee] reduced the expenditure of gasoline by 2.5 percent, and that of diesel fuel by 4.6 percent, which came to hundreds of thousands of tons. Workers of the Kuznetsk Basin achieved good results in saving coal. Much attention is being given to this matter by the party organizations of Kuybyshev, Minsk and Sverdlovsk. It is important that the saving of these resources be planned on the scale of the whole country. During the 10th Five-Year Plan it is necessary to save 160 million tons of fuel, but during 3 years 86.4 million tons have been saved, which is less than what was planned.

The sources of saving can be found at each work place. Together they will yield a mighty flow of saved fuel. Just the brigade of machine operators under V.I. Potapov from auto depot No. 3 of the Sverdlovskstroytrans Trust saved about 170,000 liters of gasoline since the start of the five-year plan. Its know-how was reviewed by the collegium of the USSR Ministry of Construction of Heavy Industry Enterprises. It was decided to "insure the dissemination of the know-how to all brigades." But they did not succeed in doing this. Why? The dissemination of know-how often ends with the adoption of a decision. But this must be considered only the beginning of the work. If the know-how has been verified, if it has proven itself well, it should be incorporated with the force of an order, and with the use of material incentives.

Where We Find, and Where We Lose...

The chief directions of economy have been determined by the 25th party congress. At meeting of party workers in the fuel sectors of industry

and allied sectors held recently in the Central Committee of the CPSU, it was noted that it is important to reduce the specific expenditure of fuel and power for production of output, to increase the economical nature of power installations, to use secondary energy resources in every way, and to intensify the struggle against mismanagement and wastefulness.

Life demonstrates that gasoline is saved by its users in different ways. In some organizations they reduce the empty runs, they are setting up precise accounting of the expenditure of fuel, they are putting the engines in order, and so on. But in others, a "saving" of gasoline is obtained sometimes owing to... writing down trips not made. A motor vehicle has made five trips in a shift, but the report sets down 8 or 10. Of course, with such "accounting" there simply is plenty of "spare" gasoline. At the Kursk Plant for Industrial Rubber Products the distance of hauling freight even recently was increased two-fold in comparison with the actual distance. After an investigation of these facts by the people's control committee the guilty parties received their just "deserts." But how many such cases have not been disclosed?

With our huge spaces the expenditure of fuel for transport depends first of all on the selection of rational hauling routes. Sensible proprietors do this. But here is a leter sent to PRAVDA by veteran of the fleet A.S. Grantovskiy from Odessa. He writes: "Steel pipes for oil and gas trunk lines are sent from Japan to the USSR. The pipes are shipped on vessels of our commercial fleet and are carried by sea around all of Southern Asia through the Indian Ocean, the Suez Canal, the Mediterranean and Blackseas to the port of Il'ichevsk near Odessa. Here they are reloaded on railroad platform cars and sent... to Western Siberia. The absurdity of such a route is evident from the first look at a geographical map. Why sail around the world, when there is a second, shorter route from the Far East to Tyumen? Does not the pursuit for ton-kilometers force the transport workers to make a huge detour?"

It is said, where it is thin, it breaks, where there is much, it spills over. Our oil workers are continuously increasing the extraction of oil, and the country is rightfully proud of their labor. However they also lose a lot in the process of extraction of oil, in preparing it for transport. This was discussed by scientist P. Kozlov who recently appeared in PRAVDA with the article "Don't Lose It, Save It." The author proposed: make the wages at the oil fields directly dependent on reduction of the losses of oil and casing-head gas, introduce strict, scientifically based norms in this matter. How did the Ministry of the Oil Industry react to the article? In a letter from deputy minister A. Valikhanov much is reported, but there is no answer to the questions raised. But it is necessary to evaluate with more self-criticism the state of affairs in the sector, to hold responsible the leaders of those oil fields where torches blaze, burning very valuable casing-head gas. It would not be out of place to tell the readers why a decision on construction of gas refineries is made, as a rule, 8-10 years after the start of development of a deposit, when half the resources of gas has already been burned up.

The expenditure of liquid fuel also depends on the level of engine building. It makes a great deal of difference how much gasoline an automobile uses for every 100-kilometer run. The designers of the "AvtoVAZ" Association can be proud that the Zhiguli and Lada are on the level of the best vehicles in the world with respect to this indicator. Kolomna diesel locomotive builders have created and have underway series production of high-capacity diesels which occupy leading positions in the world with respect to fuel expenditure. Minsk motor builders are supplying "economical" output. But still we are producing many out-dated, rather "voracious" engines. It is necessary more energetically to place more progressive vehicles on the plant conveyor belts instead of these.

It is very important to introduce a system of incentives for a saving of fuel that is effective, simple, and understandable for millions of people. Up to now such a system does not exist. For more than two years instructions have been in effect in the country authorizing the fining of those fuel users who, having saved it, did not take from the oil depot the previously designated quantity of gasoline. Three times PRAVDA has come out for the fastest possible review of the instructions. Now we report with satisfaction that the instruction has been corrected, from now on it is not necessary to pay fines for a saving of fuel.

There are many abuses in the expenditure of gasoline due to its sale by coupons. In order not to make the "dealers" rich here, it is necessary to sell fuel only for cash, to revoke all coupons. It is advisable at all filling stations to put cash tellers, like in the savings banks, and this teller should "punch" in the route books the amount of gasoline issued. Such a method of selling fuel will make it possible to expend the fuel more thriftily, to strike speedily at the abuses at the gasoline pumps and the distortions of data in transport.

The operation of boiler facilities and heating stations here is evaluated according to the volume of heat directed into the network. So it turns out: outside it is April, the weather is warm, but it is impossible to touch the radiator. It is necessary to open the windows wide, or even the French window, in order to reduce the heat in the apartment. In return the plan for issuing heat is exceeded. Heat engineering scientists have determined that overheating apartments by each extra degree increases the expenditure of heat by four percent.

However, heat escapes from the apartment buildings not only through the doors and casements. In the last two decades, architects and builders, in their enthusiasm for reinforced concrete panels, have sharply reduced the thickness of the outside walls, at the same time increasing the window openings. Such buildings are wasters of heat. Per one square meter of exterior walls the expenditures of heat have increased 1.6-fold in recent years, and in panel buildings in comparison with brick buildings the increase has been almost three-fold. There are tens of millions of apartment buildings in the country. How much heat is expended to warm up the streets!

This means that directed programs of saving fuel should have not a departmental character but a national economic character. Otherwise there will be a saving in one place, but much more will be lost in another.

In many countries apartments are equipped with regulating valves which make it possible to reduce the flow of hot water to the radiator when it is hot weather, and increase it if it is cold in the building. But here, even in new buildings, as a rule, we are not installing such valves. We have asked the RSFSR Minister of Housing and the Municipal Economy S.M. Butusov: when will there be devices for regulating heat in the homes and meters for the expenditure of gas in kitchens. The minister sighed: there is no end of work here. And he began to explain that one does not get the valves free of charge from industry.

It is clear that a saving of fuel requires certain expenditures. But the saving of each ton of fuel costs three times less than the extraction of it. It is time to centralize the administration of small boiler facilities, heating networks and heating systems within apartment buildings. It is advisable to establish centers for servicing and repair of heating systems, and to automate the regulation of the release of heat depending on the outside temperature. It seems that this work will be taken under special control by the soviets of people's deputies, and local party agencies.

Without Decreasing the Comfort

Problems of saving fuel resources are raised especially acutely in the resolution of the CPSU Central Committee and the USSR Council of Ministers on improving the economic mechanism. Set as one of the chief indicators of the work of production collectives is the assignment regarding the average reduction of norms of expenditure of the most important types of physical resources. The USSR State Committee for Standards (Gosstandart), jointly with ministries and departments, has been given the job of reviewing outdated standards for machines and equipment which spend fuel wastefully.

The planners and suppliers have to work out optimum schemes of freight flows. Now the material incentive fund will increase depending on the saving of physical resources. Under such conditions the labor collectives will be interested in saving these resources, including fuel and heat energy.

Any economic mechanism is tuned up by the people. The success of the matter depends to a decisive degree on the conscientiousness, the sense of duty of each participant in the spheres of administration, production and circulation. It is important that they all strive to close the cracks through which fuel is being lost. As we have seen, there are especially many such cracks at the locations of its chief consumers--in industry, construction and transport. There are many of them also in the supply sphere.

In a word, it is necessary to save everywhere, but not at the expense of the interests of the workers. We would like especially to hold back the impulses of those administrators who are ready even today to turn off the hot water in the shops or homes and to achieve a saving of heat. No, this is not the route we must take! It is important to record still more accurately the production and expenditure of each liter of gasoline, of each calorie of heat, every kilogram of coal, or cubic meter of gas. It is necessary to introduce more rapidly and everywhere scientifically based progressive norms of consumption of fuel for the production of a unit of output, economically to interest everyone--from the worker to the minister--in thrifty expenditure of its resources. And, finally, it is necessary to heighten the role of the nationwide socialist competition for thrift, to increase the personal responsibility of each of its participants for the assigned work.

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PROBLEMS WITH BUILDING NORTHERN GAS PIPELINES

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[Article by O. M. Ivantsov, Ministry of Construction of Petroleum and Gas Industry Enterprises: "Scientific Problems in the Construction of Northern Gas Pipelines"]

[Text] The development of the gas and petroleum industry involves Western Siberia and the Soviet Northland.

A major construction project of our time was the designation given the West Siberian fuel and energy complex, identified by the 25th CPSU Congress as the national economy's principal base for oil and gas extraction. The December (1977) Plenum of the CC CPSU noted that, in the decade ahead, a crucial role will be reserved for oil and gas--Tyumen above all--in providing the country with fuel and energy.

The construction of trunk pipelines in the Soviet Northland has a history of its own. The first gas lines on permafrost were built in the Yakutskaya ASSR and from Messoyakha to Noril'sk, and pipelines were laid above ground in Ukhta. The laying of trunk lines in Western Siberia started in 1964. The deposits of Siberia now are linked to consumers by high-capacity pipeline systems.

Results from research, experience from planning, building and operating, and the study of foreign efforts (the United States and Canada) have made it possible to formulate the first normative documents and to establish the scientific and technical basis for construction of northern pipelines.

However, it remains for us to solve even more complex problems respecting the pumping of great amounts of hydrocarbon fuel for tremendous distances.

The construction of tens of thousands of kilometers of large-diameter gas pipelines is contemplated for transporting hundreds of billions of cubic meters of gas from the deposits of Western Siberia in 1990. The gas from the northern deposits into areas in the center and west of the country will have to come via systems made up of numerous strings of trunk pipelines.

Enlargement of the distances for delivering oil and gas by pipeline to 2500-4500 km increases transport outlays and the production cost substantially. Hence, efficiency as well as reliability govern the technical and economic policy, and the strategy of northern pipeline construction.

Present-day gas pipelines in the arctic and subarctic regions must have, as energy and engineering structures, fundamentally new technical and technological indexes. Each pipeline trunk has to be characterized by maximum productivity since the laying of northern gas pipelines under the exceptionally complex natural conditions is very costly and requires considerable labor input. The corridors for the trunk lines are limited. The probability of breakdowns due to the environment, and the occurrence of defects in the pipes in the course of construction and operation is proportional to the length of the pipelines.

The Ob' River region traversed by the gas lines is inundated over tremendous distances; the Urengoy-Chelyabinsk, Surgut-Polotsk, Punga-Vuktyl, Ukhta-Torzhok stretches and many others abound in swamps. Under such conditions, a large diameter not only complicates pipeline overloading but also leads to increased pipeline-surface contact with low-cohesive soils, which is conducive to the development of deformations on the curvilinear segments from longitudinal forces due to pressure and temperature.

Optimization computations done recently have indicated that the maximum diameter of pipelines will not be increased in the period in question. Therefore, increasing throughput has to involve raising pressures to 120 kgf/cm^2, cooling and liquefaction of natural gas, the optimum separation of compressor stations and the reduction of surface roughness inside the pipes. Productivity also depends on improvement of the quality of gas processing at the fields.

The gas transport parameters directly influence the design of the pipelines, their reliability, and the whole construction process. Selection of the parameters has to tie in with the potential for ensuring functional efficiency of the pipes themselves--a practice not followed heretofore, unfortunately.

The cooling of large quantities of gas, conveyance of the low-temperature gas, and rational cold-recovery at the consumer end represent complex scientific, engineering and economic problems. But they have got to be solved because the only alternative for substantially increasing trunk throughput is the laying of a large number of parallel gas lines, which calls for significant expenditures of metal and human labor, has negative environmental effects, and lowers the systems' functional reliability.

Trunk pipelines, notwithstanding their outward simplicity of design, differ fundamentally from other metal structures due to the complex pattern of force-factor interaction, the extensive indeterminacy of the stress-deformed state, and due to the very size of them.

The impossibility of inspection and instrumented surveying of pipelines in operation increases the probability of the occurrence of breakdowns. It is

not by chance that other types of steel structures suffer less failures than are found on trunk pipelines. This stems from the specific nature of extended underground construction and its inadequate refinement.

A systems approach to studying the scientific problems of northern pipelines enabled us to identify the most important ones with respect to the efficiency and reliability of trunk lines.

At the present stage of pipeline transport development, the reliability of gas and oil trunk pipelines has become the governing requirement. No general theory of trunk pipeline reliability exists, and that lowers the certainty of technical and technological decisions which are being made and impairs the evaluation of their effectiveness.

Trunk pipelines belong to the higher-than-usual-risk category of systems. An analysis of pipeline breakdowns over the years has shown that the structure of the statistical record is irregular. Typically, only a small fraction (up to 5%) comprise significant failures. In order to analyze pipeline reliability it is necessary to break out each parameter from the total number of events characterizing a system's unreliability. Such an approach is in accord with a basic assumption of systems reliability theory the essence of which is that breakdowns of individual elements generally result only in a depreciation of the quality of system functioning.

However, all of the factors governing the reliability of pipelines have not been analyzed thus far in studying the breakdowns.

The development of a theory of reliability would make it possible to properly evaluate the influence of gas transport parameters, environmental conditions, design assumptions, and probability in the application of various factors. And it would be possible to decide on a reliability level and a time-span for trouble-free system operation.

The procedure for pipeline strength calculation is set forth in SNiP [Construction Norms and Specifications] II-45-75. This procedure, essentially, is in conformity with contemporary scientific opinion on the work of pipelines. It requires further improvement however. First of all, the system of coefficients and their values needs to be reexamined. The coefficients of safety for material, and for working pressure overload, and other coefficients have no scientific-statistical foundation. The coefficient of working pressure overload is designated as uniform over the entire length of a run between compressor stations while, in actuality, the pressure at the end of such a segment is less than the initial pressure by 18-20 kgf/cm^2.

The numerical modeling of situations when the pressure in the pipeline might exceed the working pressure makes it possible to determine when the overload factor needs to be taken into account. It was found that allowing for it on a segment exceeding 25% of the length of a run between compressor stations makes no physical sense. Introduction of the overload coefficient when proceeding from the triggering system for an automatic valve closer is unneces-

sary. When the calculations have been refined resources for saving metal are going to be revealed.

It is to be noted that strength calculations are not connected with norm setting for defects. The technology for manufacturing pipes and building pipelines tolerates the defects. For example, a welded joint, for strength calculation, is viewed as equal in strength to the base metal; and the technological instructions allow incomplete fusion (up to 10% of wall thickness), certain size pores, misalignment of edges and so on. And the possibility of corrosion damage is not taken into consideration even though it is the most prevalent type of damage during the period of use.

The safety coefficient for the material takes into account the method of steel rolling and pipe manufacture, type of welding, and also the results of nondestructive tests of the base metal and the weld. Permissible laminations, striations, dents and anomalies of geometrical form are paid no heed in the strength calculations.

The interaction of pipelines with various soils has not been adequately studied. Overstrains which occur in pipelines are often the result of uneven sagging or heaving of the ground and cantilever hanging of the pipeline. A study of pipeline breaks shows that a substantial number occur at the corners of curves where added stresses arise.

The instruments which are being used enable the stressed state of pipelines to be determined at separate points only. Special instruments and procedures need to be developed to make it possible to evaluate the actual stressed state around the pipeline wall without an opening. Then, by means of preventive maintenance, the trouble situations, which occur mostly from defects and pipeline segment overstrain, can be practically eliminated.

Dynamic effects on pipelines from pumping equipment operation have not been adequately studied.

The application of major scientific advances of recent times facilitates not only the development of a procedure for more reliable pipeline strength calculations but also the solution of fundamentally new problems in assessing the service life of pipelines, their carrying capacity with respect to time (useful life).

The switchover to determining strength and useful life according to up-to-date criteria on resistance to long-term static and dynamic effects is important.

The employment of computers makes it possible not only to shorten the time required for calculation and planning, but to substantially enhance the level of these operations as well.

The high reliability of the parts used in aircraft, missile and space equipment, reactor construction and shipbuilding stems to a considerable degree

from the diversity of testing and from a saturation of programs for experimental development. The same can not be said about trunk pipelines.

In recent time there have been but few experiments from whose results it would be possible to determine with adequate certainty the true stressed state of large-diameter pipelines operating under varied temperature and soil conditions. Such experiments would facilitate refinement of the procedure for calculating gas pipelines as to longitudinal strength, the determination of specifications for joining them, and the development of optimum decisions respecting design.

The problem of establishing the minimum temperature for laying pipelines has not been fully solved even though it is extremely important to construction.

Taking account of the fact that the restrictions on the movement of a pipeline are not laid on right after it has been covered but only after the covering operation has moved ahead by a substantial distance, i.e., when the temperature of the covered pipeline has already risen, it is evidently possible, without altering the rated temperature gradient, to allow lower temperatures for construction than the plans indicate.

The researchers must focus their attention on studying the functioning of gas pipelines in swampy areas and permafrost and sites of turns and raised curves for varying gas temperature. These experiments must be performed systematically.

The parameters of steel toughness, which characterize its ability to resist rupture and are one of the chief criteria of the working capacity of pipes, and also the methods for determining toughness, have recently become the subject of extensive scientific discussion.

It is necessary to develop a scientifically deduced procedure for checking the strength of a pipeline according to the toughness of the steel, and to work out methods for calculating toughness indexes applicable to a given level of pipeline working capacity.

The statistics on breakdowns don't establish the actual number of brittle fractures in pipelines; instances in which the failure is of a mixed nature are frequent. There are comparatively few failures due to poor quality of the metal (chemical composition, smelting and rolling technology).

Many scientists and specialists maintain that if the major share of failures isn't due to a defect in the metal (corrosion, construction and installation, irregularity in operating conditions), then upgrading the quality of the metal won't prevent the failures. They say: Eliminate the causes of damage, i.e., the defects in planning, construction and operation, and there will be no protracted disruptions because there will be no sources for them to start from.

But we can't agree with that.

In the pipes and in the pipeline, defects related to the quality of metal and welds, the expansion of pipe ends, corrosion, and to the conditions of haulage, construction and usage are unavoidable. And in the unseen underground structure whose stress-deformed state has not been precisely enough determined, all of these defects can lead to failures.

The paths of crack propagation, as a rule, traverse the base metal and near-seam zone. It is therefore rightful to impose high requirements upon the base metal, including its qualities of toughness, in order that an initial defect not propagate extensively. It is possible, too, to pose the task of preventing the development of cracks; but then the metal has to be highly alloyed.

The potential for the occurrence of brittle failure rises in connection with the construction of gas pipelines in the subarctic and arctic regions, in connection with increase of the length of large diameter gas pipelines and increase of the pressure in them, and in connection with the use of cooling.

Since the level of permissible stresses in the walls of gas pipeline pipes depends to a considerable degree on the actual indexes of the steel's toughness, there is at present, given the available levels of toughness, no sense in using steel with a tensile strength of more than 60-65 kgf/mm^2 for large diameter pipes.

Improvement of the strength properties, reduction of wall thickness and the corresponding elevation of the level of stresses at a given working pressure augment the elastic energy of rupture propagation and call for enhancement of toughness characteristics in order to prevent extended breaks. This proposition, likewise, is in need of further scientific approval.

In the USSR and elsewhere, the use in gas pipelines of special devices to inhibit the development of cracks (stoppers) is not practiced.

A study of recent years' failures, including the connections of compressor stations when a crack traversed valves with thick-walled bodies and pipe parts, caused doubts as to the possibility of developing designs for simple devices capable of stopping brittle cracks. However, studies conducted in the United States, Canada and Italy, and an experiment with multilayer inserts in the area of the Vyngapur deposit demonstrate the possibility of artificial arrest of viscous and brittle cracks. And opinions are being voiced that even heavy collars may be suitable for arresting viscous cracks. The use of stoppers alters only the scale of the breaks and, in our opinion, mainly facilitates the inhibition of viscous cracks. To stop the brittle cracks sufficiently elongated or multilayer inserts are needed.

It is necessary to continue investigations to study the pattern of gas pipeline failure when stoppers are used, and also to develop optimum designs and materials for crack-inhibiting devices, including multilayer-pipe inserts. The use of stoppers needs to be evaluated also from the economic standpoint.

The character and quantity of welding and metallurgical defects, of surface damage, and the conditions and mechanism of their development in time should be studied in order to evaluate the hazard level of the various defects relative to formation of cracks of critical dimensions with subsequent failure.

The definition of the permissible welding and metallurgical defects is not based on reliable statistical data; consequently, the adopted reject criteria are, to a certain extent, arbitrary. The same situation prevails with regard to defects on the surface. Fully reliable methods and means haven't been found for total quality control of construction and installation work or the state of pipelines in use. This applies in like measure to the determination of the actual corrosion state of pipeline segments by means of a direct instrument method, not by integral evaluation using cathode polarization.

The procedures used to test full-size pipes and lengths of pipe are in need of improvement. For instance, the VNIIST [All-Union Scientific Research Institute for the Construction of Trunk Pipelines] test of full-size pipes by hydraulic pressurization with introduction of only 15% air doesn't fully simulate the work of a gas pipeline. If the air is replaced by gas the results will be otherwise. It is necessary, in addition, to evaluate the choke effect for short lengths of the pipes being tested, and to select optimum lengths at which it doesn't show up.

Investigations suggested a possibility for a reliable resolution of the northern gas pipelines problem--the use of multilayer pipes, proposed by the Institute of Electric Welding imeni Ye. O. Paton. For gas pipelines made of multilayer pipes it is necessary to develop new procedures for strength calculations taking into account the specific nature of the work of the multilayer pack, the hardening of light-gage strip rolled stock, and the lower temperature of transition from the viscous to the brittle state in a pack of sheets as compared with a monolithic wall of equal thickness.

The reliability of trunk pipelines is in many respects governed by the quality of welding of the assembly butt joints.

Considerable progress has been achieved in pipeline welding.

Successful experience in resistance welding of pipelines opens up new prospects for trunk pipeline construction. We face the task of reequipping the sector in order that resistance welding become the dominant welding process in the building of pipelines, which will increase the rate at which they are built and improve the quality of their construction.

The accomplishment of this task will require not only improving the technology, the machines and the control methods, but changing the organization of labor as well.

It has been found that the high power of the electric plants (1000 kW) is in use for just several seconds during resistance welding. We are looking into the posssibility of supplying this load via storage and replacing the heavy and cumbersome 1000-kW diesel plant with a small gas turbine unit.

Techniques for soldering large-diameter pipelines are to a certain degree an extension of the idea of resistance welding of pipes. High quality soldered joints have been successfully applied on pipes of 426 mm diameter.

In the case of the northern trunks the use of soldering is especially efficient because of the simple technology and high productivity.

Fundamentally new trends have taken shape in welding in recent years based on the use of a highly efficient energy source--the laser beam. Welding by laser beam, like electron beam welding, provides "knife-edge" fusion but, unlike the latter, doesn't require a vacuum. Studies which have been done make it possible to predict some numbers respecting laser beam welding of large-diameter pipes. In automatic gas-arc welding the orbital speed is up to 30 m/hr, in manual arc welding by the sectionalized flow-line method up to 20 m/hr; in the case of laser beam welding it can reach 100-150 m/hr. The rated time for welding a 1420-mm diameter pipe amounts to 2-3 minutes. In the process, the labor-intensiveness is cut to a third and the power consumption for a single butt joint is reduced to about one-fifth. The electric plant capacity amounts to just 200-250 kW. The development of the production facilities for laser welding of pipelines calls for the solution of a set of complex scientific and engineering problems.

The pumping of highly viscous oil with heating, laying pipelines in regions with highly aggressive soils, and increasing the pipelines' surface of contact with the ground substantially complicate the problems of protecting pipelines from corrosion.

The theoretical basis of the processes of corrosion under the conditions of pipeline microclimate, and an evaluation of corrosion activity of the soils in the swamp areas of the Ob' River region taking into account the effect of biological factors, are needed.

The construction of power transmission lines along pipeline routes for the purpose of cathode station power supply is inefficient and technically difficult. For this reason, cathode stations with autonomous current sources--primarily thermoelectric generators--must be used extensively on the northern routes.

Their efficiency has to be further upgraded by enlarging the modules (switching from UMG 80 to UMG 200 or more). VNIIST, in collaboration with VILS [expansion unknown], developed tape protectors made of magnesium-aluminum alloys which have found application on the northern routes. Protector protection based on new scientific and technical principles should be widely introduced on the northern pipelines.

The effect of magnetic storms in the ionosphere on the protection facilities needs to be studied. This phenomenon can alter the magnitudes of current and protection potential on a pipeline and, by the same token, cause it to corrode. The potential for occurrence of these phenomena on USSR territory needs to be evaluated.

The procurement of pipes which have been insulated at the plants is of particular significance in the construction of northern pipelines. Up to the present time, however, optimum decisions have not been adopted respecting the use of thermosetting coatings and polyethylene-base insulation. Various types of factory insulation have to be developed in order that insulated pipes be furnished to the northern routes undamaged, with reliable, guaranteed protection. Heat-shrinkable, radiation-treated polymer materials, above all, for welded joint insulation, are needed for the Northland.

In recent years, in appraising the reliable functioning of insulating coatings, the coating's adhesion to the metal has been an important factor. Adhesion depends to a great extent on the cleanness, relief and structure of the surface.

It was proven that shot-blasting provides 20-times-better adhesion with polymeric coatings than wire-brush cleaning.

Modern science has the resources to solve such problems as imparting corrosion resistance to the steel surface of pipes and the development of steels which are not susceptible to corrosion.

In the building of underwater crossings, the most complicated and laborious operation is digging out the underwater trenches, particularly in rocky ground. Preparation by underwater blasting, due to the upgrading of requirements for protecting the environment and ichthiofauna, is restricted as to how much can be done, when, and by what method.

Other methods of loosening up heavy soils are used here and elsewhere: mechanical, fire, gas jet, fragmentation by high-frequency current, hydraulic, electrothermal, electrohydraulic and others. Each method has its advantages and its shortcomings, but perhaps the most promising method is based on the use of the electrohydraulic effect. Final selection of the methods for underwater work requires additional experimental investigation.

The construction of underwater crossings by directed drilling is of interest.

The crossing layout is given in the form of a concave arch of rational (momentless) configuration. A small-diameter hole is first drilled under the river bed. Instruments are used to ensure that the hole line is precise. The hole is then enlarged and a large-diameter pipeline is pulled through. As foreign experience has shown, the method is suitable at the present time for underwater crossings using pipes up to 1000 mm in diameter.

The construction of crossings by directed drilling is especially effective for the northern conditions. There is no need for ballasting or a large amount of earth moving.

A number of scientific, technical and organizational problems have to be solved in order to overcome the "winter-season-only-ness" and master the art of summer construction of trunks in the swamplands of Western Siberia and the European Northland.

The solution of these problems is proceeding in three principal directions: the development of all-terrain construction equipment and transport facilities; construction of temporary roads capable of carrying the transport and production traffic; the development of new principles of pipeline laying and pipeline structure enabling departure from the traditional processes. There are interesting technical solutions along each of these lines; but it is only the beginning, and construction is still going on mainly during the winter.

As an interim measure we have to consider the matter of prolonging "the winter season" by means of artificial freezing of the ground, the enhancement of its carrying capacity.

Large-scale mechanized flow-line complexes which perform all the production operations are most rational for line construction.

A procedure for figuring optimum redundancy in basic and auxiliary equipment has been developed to upgrade reliability of production management in the operations of major units encompassing 500-600 workers and engineering-technical personnel and up to 300 machines and machinery units. The establishment of a reserve of machines and machinery in accordance with the suggested calculating procedure made it possible to increase the rate of pipeline laying by 10-12%. A changeover to two-shift operation in the trusts of Glavsibtruboprovodstroy [Main Administration for the Construction of Pipelines in Siberian Regions] and other trusts provided the opportunity to raise the daily progress of a large-scale mechanized complex by 60-70%. However, the system for establishing equipment reserves and the organization of maintenance service need further development. It is necessary to find the optimum structure for a complex relative to the various parameters of the pipelines and to the actual conditions of construction by means of a refined mathematical model of a large-scale mechanized complex.

The use of the hydraulic method is being expanded in order to upgrade the efficiency of tests on large-diameter pipelines designed for high pressure.

The time required for these tests has been cut, on the average, to one-third that required for testing with air. The economic gain per year has amounted to nearly 2 million rubles. An important task is to develop a work-organization scheme enabling the cleaning and testing of pipeline sections to be incorporated into a common continuous-production system. This will make it possible to reduce the construction period by 1-2 months for every 1000 km of large-diameter pipeline.

Development of the arctic and subarctic routes has brought about a search for new design and planning solutions, calculating procedures and technological methods.

Periodic aerospace photography of the trunk pipeline corridors has, in a number of cases, shown up modification of the landscape, disruption of ecological balance and increasing flooding of routes.

It is necessary to further develop system studies of the effect of trunk pipeline construction and operation on the environment. Measures have to be developed to preclude disruptions of the natural environment which are not provided for by the technology of pipeline construction and operation.

Surveying and planning operations in the tundra, forest tundra and tayga should be started after the basic alignment of future routes has been determined by way of aerospace photography.

The photographic equipment has been developed, a multizonal apparatus is available, the reliability of the photographic results has been verified, and mathematical methods for interpretation of the photographic material are being worked out.

The maximum efficiency of trunk pipelines for a given level of operational reliability can be assured only by using the method of optimal planning. It is based on the the premise that the solution of all problems of a technological, design and economic nature has to be accomplished concurrently with selection of the optimum route.

At the MINKhiGP [Moscow Institute of the Petrochemical and Gas Industry imeni Academician I. M. Gubkin] optimal planning models have been constructed (selection of route with concomitant spacing of pumping or compressor stations, design selection, identification of technological parameters etc.) from a numerical model of an area.

Particular attention should be be given to representation of the whole spectrum of conditions in an area, engineering-geological, climatic, and frost characteristics in a form convenient for use in the respective models.

It is important to tie in the requirements of mathematical optimal planning methods with the methods for interpreting the photographic material and processing it. It is necessary to find methods for computer processing of the information which is obtained. The end result of optimal planning using the aerospace photography data should be not only the generation of the optimal planning decision but automation of the planning process on this basis as well.

The aerospace photography materials should be used also in construction site organization over the entire extent of the pipeline with pumping and compressor stations, with the development of regional production bases and sand, gravel and stone facilities, and with identification of the location of temporary housing areas.

It is necessary to work out a procedure for the comprehensive forecasting of environmental change in the Northland territories under development, and to produce regional maps showing the prognosis for these changes during construction. This can be done by systematic photography of the route corridors, improvement of the quality of engineering geology surveys, and the organization of frost stations in these areas.

Reliance on the aerospace methods doesn't eliminate ground-based surveys by far. They need to be expanded and increased in depth.

In the case of certain sections of the routes the election of technical decisions in regard to preventing degradation of the permafrost, and the way the pipeline is to be kept in position, have to have scientific substantiation.

It is necessary to study freeze-thaw phenomena and the phenomena of soil creep, formation of ice, new formation of frozen ground, and undermining due to water action, relative to the construction and operation of trunk pipelines.

Much has been done in the sector to develop new, highly productive machinery and to produce quality control apparatus. In 1978 the machine building plants of the ministry of Construction of Petroleum and Gas Industry Enterprises produced 70 million rubles' worth of them.

A very high level of mechanization has been achieved for the basic operations in line construction, and more than 50% of the pipeline welding work is performed by automatic machines. However, mechanization of the work involved in clearing the construction lane, road breaking and construction, pipeline ballasting, and the loading and unloading of goods are still inadequately mechanized. The amount of machinery for preparatory and road work is small, which delays completion of the basic processes, particularly under the northern conditions.

But insufficient machinery is not the only concern in this instance. We need scientifically sound work organization with optimum levels of work performance and resource management, fixing of optimum lead times, and consideration of the Northland's seasonal fluctuations. The development of complex mechanization charts will make it possible to detect deficient machines and their technical characteristics, and in-depth studies of machine performance on technological operations will yield opportunities for proposing new principles for designing high-productivity machines, including machine complexes which function automatically.

Notwithstanding the widespread use of the packaged-unit method of outfitting pumping and compressor stations, the manual labor put into general construction, loading and unloading, and auxiliary technological operations is considerable. With approximately equal amounts of work in terms of money, the number of workers on ground construction work is 5 times more than the number on line construction. To a considerable degree, this is due to the inadequate supply of machinery and small-scale mechanized facilities for the construction units.

Under conditions of a growing scarcity of manpower, it is especially important to determine, on the basis of in-depth analysis, what the priorities are in the course of electing the directions in which to proceed with mechanization. There have heretofore been no scientifically established criteria enabling preference to be accorded to the specialized or to the universal when choosing machines.

Not all machines, by far, are suited for operation under negative-temperature conditions. According to information from observations during the winter of 1978-79, a large part of the construction machinery was not used when the temperature was below -40°C.

Investigations are needed to determine the optimum capacity of various machines for building the pipelines in the Northland.

For the successful accomplishment of operational planning it is necessary to develop scientific principles and procedures for designing the sector construction organization for one year, two years or longer. The reserves here are vast. Solution of the operational planning problems will enable the maximum use of sector resources allowing for winter construction seasons in the Northland, the balancing of work-volume distribution, a reduction in the time it takes to equip trunk pipelines with pumping and compressor stations, establishment of the optimum stockpiles, and minimization of the time it takes to move equipment. All of this will ensure successful fulfillment of the annual plans and the five-year plans for putting the most important projects into operation.

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SOCIAL INFRASTRUCTURE IN DEVELOPING REGIONS EXAMINED

Moscow STROITEL'STVO TRUBOPROVODOV in Russian No 8, Aug 79 pp 16-18

[Article by A. D. Khaytun, NIPIESUneftegazstroy (expansion unknown): "Residential Housing Construction in Western Siberia"]

[Text] The immediate purpose of construction in the oil and gas regions of Western Siberia is to strengthen the country's fuel and energy base. At the same time, the social infrastructure* of the region under development can not be regarded merely as a means of achieving production results. The socio-economic transformation of the new territories and subsequent settlement of areas favorable for permanent habitation are, per se, public matters.

From the outset of development of the oil and gas deposits of Western Siberia the city population of that region increased by nearly 500,000. The population of such cities as Surgut and Nizhnevartovsk passed 100,000. During the 1971-1978 period, more than 3 million square meters of living space, many cultural and personal service establishments, schools, kindergartens etc. were built.

However, the rate of residential housing construction still does not fully match the rapid population growth in Western Siberia. Here, the builders have less residential space available to them as compared with the workers in the industrial sectors of the national economy.

The Ministry of Construction of Petroleum and Gas Industry Enterprises and the Ministry of Industrial Construction are the principal contracting ministries concerned with residential housing construction in Western Siberia. Now, almost one out of every three sector workers in the region is on residential housing construction and this proportion is constantly increasing. It can be claimed that residential housing construction in the Northland is becoming a sector specialty. The Ministry of Construction of Petroleum and

*) The social infrastructure of regions under development is a system of organizations, institutions and enterprises for satisfaction of the socio-domestic and spiritual needs, the material basis of which are the fixed capital funds for housing, cultural and domestic purposes (residences, schools, hospitals, stores etc.).

Gas Industry Enterprises was called on to exert an active influence on the management of city design and building in the new territories, to develop general plans for the new cities.

The rates of living space production in Tyumenskaya Oblast depend on the capacity of the building industry, production potentials of the building organizations and, also, the possibilities of getting building materials from other areas. Further development of the oil and gas industry at the present time requires special measures for the earliest possible elimination of the social infrastructure lag and, at the same time, the restriction of population growth in the regions under development.

This contradiction is becoming more pronounced in connection with the onset of a new stage in the development of the oil and gas complex of Western Siberia. New deposits with relatively worse technical and economic indexes and, also, with complex geological characteristics are being opened up in extensive quantities. Decentralization of the dispersal pattern is increasing, shifting northward into near-Arctic and Arctic areas. The gas industry and geological prospecting are being developed at high tempos. All of this is leading to a sharp upswing in the number of workers and others employed in the oil and gas business and, hence, an upswing of the population of the northern regions.

A significant increase of personnel in the oil and gas industry of Western Siberia is anticipated over the next 10-12 years.

If we apply the traditional pattern, it would be necessary to settle in excess of 3 million city inhabitants in the Khanty-Mansiysk and Yamalo-Nenetsk districts and to build over 30 million square meters of housing. The capacity of industrial housing construction of Tymenskaya Oblast by the end of the 10th Five-Year plan should be brought up to a million square meters a year, which is clearly inadequate for such population growth rates.

Solving the problems of developing the social infrastructure merely by enlarging the production capacities of the territorial organizations occupied with residential housing construction is hardly acceptable, for it would then be necessary increase their personnel to some 135,000 while tripling the capacity of large-panel housing construction. That will result in the need to provide housing for another 300,000 or so people, and the construction of new house-building combines is limited by the small supplies of local building materials. Moreover, with the decentralization of construction projects in the Northland, transportation conditions often make large-panel housing construction inefficient. Practice tells us that it takes up to 5 years to construct house-building combines and get them up to planned capacity.

The solution to the lagging social infrastructure problem can not be an easy one. A similar, vast program for Northland city planning and development sooner has not been implemented yet.

It was proposed [1] to carry on housing construction in Western Siberia on the basis of its centralization in several large cities (support and base): Surgut, Nizhnevartovsk, Urengoy and others. Here were to be settled the families of workers on expedition-type duty, primarily, and residing during a work cycle in duty settlements and field towns. This results in a uniform "base city-duty settlements" dispersal system tied together by transportation lines. In zones not suited for permanent habitation by virtue of nature and/or climate, expeditionary settlements and organizational-administrative centers are set up.

These suggestions were used to a considerable extent in the general plans for new cities. However, certain difficulties arose in the course of implementation. The duty scheme is based on the intra-area distribution of labor resources and does not prevent rapid growth of the population. With residential housing construction concentrated in the base (support) cities, substantial economic and social effect is attained. At the same time, many families unable to obtain housing in the city are compelled to live in the duty settlements and field towns where pub'ic amenities and the level of social and household services are severely lagging.

In order to resolve this discrepancy, it was suggested in [2] that there be interregional utilization of the labor resources and the social infrastructure. Qualified personnel employed in drilling, ground work, line construction etc. are now being attracted from areas where they have made their homes. More than 30,000 builders of the Ministry of Construction of Petroleum and Gas Industry Enterprises are working in the expedition-duty scheme in Western Siberia and some 8000 are working in the Ministry of the Petroleum Industry's system on the development of new deposits. This method is being used extensively in geological exploration also. Nevertheless, interregional utilization of the social infrastructure is just leveling off the "peak" of personnel growth in the sectors of the oil and gas complex, easing the situation which has developed in residential housing construction; but it isn't solving all the problems. Mass application of the expedition-duty method entails considerable organizational difficulties. With interregional utilization of manpower resources, the outlook is that just 25-30% of the oil-gas complex's workers may be employed. In order to increase the number of workers working under the expedition-duty method, elaborate organizational measures are required.

In connection with this, solutions which were earlier rejected as inefficient for residential housing construction in Western Siberia are unavoidable. They include, first of all, building base cities and worker settlements with wood (log, block, panelboard, prefab and other) houses, suited to local conditions and having a contemporary level of convenience. It is important here to make provisions for industriality of the construction, to develop a base in Tyumen for wood panel house construction, and to build up the combines in the area. It is already planned to speed up the commissioning of new facilities for modular and packaged-unit buildings in Ukhta, Sayanogorsk and Pyzhma, and to send their output to the newly developing regions of Western Siberia.

In the opinion of specialists, the need for plants producing mobile, packaged and modular housing according to up-to-date technology is ripe. The demand for these types of units is very high, but the design and engineering and the convenience level of the mobile homes being produced now is inadequate.

The principal objection to the mass use of wood homes for residential construction in the Northland was that they might esthetically degrade the architectural appearance of the new cities, have a relatively low comfort level, not last long, and would require a lot of labor to build. This objection is being negated by way of providing the required level of industrialization and construction with prefabricated parts. Type plans for wood buildings with improved architectural appearance and adequate comfort have been developed. As regards durability, the oil-gas complex demand for personnel, and the population numbers connected therewith will be contracting after the basic period. The use of housing of relatively short durability will reduce unproductive outlays. In the distant future, housing in areas with adverse, extremely severe natural and climatic conditions will have to be provided for just a necessary minimum population. Also suggested [3] were city planning and building solutions involving settlements at the oil and gas fields, making it possible to combine the dispersal of permanent and duty personnel, and taking into account the dynamics of development of the fields. In the construction of the base (support) cities, the center of capital development is concisely delineated and the heat supply, power supply, and engineering systems are calculated for the total development including the space-saving forms (city blocks, microrayons) comprised of mobile and temporary housing. After the peak numbers of workers are released, the whole period of development and effective exploitation of a field doesn't last over 10-15 years; the temporary development can be painlessly removed from the structure of the populated area.

The sizes, the rates of development and the natural and climatic conditions of the oil and gas regions of Western Siberia rule out confinement to any one city planning and building scheme and demand a comprehensive solution. The distinguishing feature of the required dispersal and settlement system is dynamism, flexibility. The leading sectors of industrial production comprise the kernel for developing the system and, likewise, the infrastructure of the territorial production complexes, and the chief problem in the planning is to correlate this system with the growth prospects for the leading industrial enterprises (e.g., the city of Naberezhnyye Chelny with the KAMAZ enterprise) spacewise and timewise; and in the West Siberian region the principal industries have a high degree of space-time indeterminacy. In the case of architectural planning with a lead time of 10-15 years, it is extremely hard to figure out the sequence, the scale of development and exact territorial bounds of these businesses. Moreover, the economic-geographic conditions for locating a production base are often of limited acceptability when it comes to establishing populated areas. The results of studies done at the Leningrad Scientific Research Institute for Planning City Construction (LenNIIPgradostroitel'stva) (E. A. Milevina, project supervisor) showed that a construction complex (including enterprises of the building industry) which exhibits great development drive, a high level of concentration, and is in firm natural and transportation circumstances becomes the pivot of city-building

development of a region. Therefore, in the election of city building and planning decisions the role of contracting ministries, the ministry of Construction of Petroleum and Gas Industry Enterprises above all, is substantially heightened. The sector approach to the socio-economic development of Western Siberia, while possessing a number of economic and organizational advantages, is little conducive to the adoption of fast and effective measures to hold down the population of the northern regions. The demand for housing is going to increase in the future, and this entails new decisions respecting the organization of residential housing construction and providing qualified personnel for construction projects. In the sector, methods which have proven effective are being used to provide personnel to the most important projects of Western Siberia. It is a matter of bringing practical experience into the system [4]. Primarily, this relates to reinforcement of public law respecting the use of the labor of temporary and seasonal workers, laying on organizational conditions for interregional use of labor resources in accordance with the scales of residential housing construction in the Northland, and to the use of building industry production facilities in the country's populous areas for the development of the social infrastructure of the oil and gas complex.

By expert estimates, the construction projects of Western Siberia annually employ more than 12,000 temporary and seasonal workers, i.e., one out of every six territorial construction organization workers. In the spring-fall period they are used mainly in residential housing construction, public services and amenities, road construction, loading and unloading operations during the navigation period, and on line construction during the winter. Natural and climatic conditions and the condition of the region's main transport routes give rise to seasonal redistribution of the labor resources on construction and installation work. In particular, residential construction picks up during the summer, so the influx of temporary workers is therefore desirable and the shortage of skilled personnel makes the use of their labor necessary.

However, the quality of the temporary workers' effort often falls short of the needs of contemporary construction. The main reason is that temporary workers are gathered up spontaneously, for the most part. To promote a systematic approach to using the labor of temporary and seasonal workers, a number of legal and organizational measures based primarily on the adoption of total work-time accounting would be advantageous. This will make it possible to regulate the labor of the seasonal workers and will give them an opportunity for R&R back home between seasons. It would be desirable to systematically put together brigades for seasonal residential housing construction (mainly to erect wood houses and civic buildings and structures) in the relatively over-manpowered areas of the country which have a tradition of "seasonal work".

In the past year almost 10,000 members of student construction detachments were employed on the construction projects of Western Siberia, carrying out the program of two large construction trusts during the summer. The detachments' labor is especially effective in residential housing construction. The scale of activity of the detachmments is such that upgrading their organization status was desirable--the incorporation of student operations in long-term planning. Also possible is the conclusion of long-term (five-year plan)

agreements providing for work on specific projects, material and equipment supply including the seasonal delivery of materials, teaching building trades to students right in the higher educational institutions etc. The results of the detachments' efforts can be substantially upgraded.

In contrast to the situation in trunk pipeline construction, the interregional use of labor resources by directing construction and installation units to remote-area projects has not gained adequate scope. The qualified workers are ordered to the most important projects of the oil and gas complex, rather as an exception. However, there are prospects here for using the expedition-duty method.

In the first place, this attracts replaceable teams from other areas of the country into the territorial organizations and enterprises of the construction industry of Western Siberia. Existing organizations working in residential housing construction might switch to the expedition system in their home areas. The teams' workers, regularly sent out under the expedition duty system to the northern regions, are then assured well-managed housing at their families' place of permanent residence. The organizational set-up for such construction can be an expeditionary trust [4].

Secondly, on an expedition basis the installation teams from the house-building combines can get into the act. Experience in a similar activity has already accumulated in the Sibkomplektmontazh association in the course of the unitized construction of pumping and compressor stations. The method is based on doing the greater part of the work at the plant and cutting time and labor at the construction site. This also is in line with the need for cutting the number of workers and the population in the regions under development. The radius of operation of the association's installation teams has already reached outside the region's boundaries. The principle of unitized construction can be successfully implemented as well in prefabricated housing construction, especially if the houses are assempled from light-weight and wood components. There is also considerable experience in the construction of completely prefabricated housing in remote areas, involving the assembly of multi-story dwellings from reinforced concrete units and other structural components. Organizations of Glavmosstroy [Main Administration for Housing and Civic Construction in Moscow] are doing construction by this method on a large scale in Naberezhnyye Chelny and Tynda. In Tynda, the delivery range for the building structures reaches several thousand kilometers. In connection with the start of operation of the Tyumen'-Surgut-Urengoy railroad it is becoming possible to use the facilities of the house-building combines in the central and Ural areas of the country for development of the base cities in Western Siberia.

The labor schedules for workers in residential housing construction under the expedition-duty method are less dependent on seasonal fluctuations. Relatively short cycles of work and rest are possible in this case. For example, 1.5 months of work, then 3 weeks of rest. However, in the case of construction in areas difficult of access, a labor activity cycle based on the building season is possible in the duty settlements. These work schedules need to be

tested in practice. Success in promoting the expedition-duty method in residential housing construction will depend largely on the development of its organizational configurations. It is important to set wages, privileges etc. in conformity with the specifics for interregional utilization of manpower resources, and to establish fit social and living conditions for the workers.

* * *

Coordination of the efforts of all sectors of the oil and gas complex, territorial administrative organs and public organizations is important for the social-economic development of Western Siberia and the accelerated build-up of the social infrastructure. It is necessary to improve residential housing construction, optimize city building and planning decisions and pursue a policy of maximum effective utilization of manpower resources. The petroleum-and-gas-industry-enterprise-construction sector, as the invested subsystem of the oil and gas complex, has an important role to play here. In connection with this it is ugently required that comprehensive scientific investigations of the socioeconomic matters involved in construction in Western Siberia and in the development of the social infrastructure of the oil and gas complex be broadened and deepened.

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PROBLEMS AT A COMPRESSOR STATION REVEALED

Moscow STROITEL'STVO TRUBOPROVODOV in Russian No 8, Aug 79 p 31

[Article by V. A. Tyutyunnikov, SU-7 (Construction Administration No 7) of Glavneftegazelektrospetsstroy (Main Administration of Petroleum and Gas Industry Special Electrical Construction), Belousovo, Kaluzhskaya Oblast: "Electrical Installation Work at a Compressor Station"]

[Text] Electrical installation work at the Yarkovskiy compressor station (Vyngapur-Chelyabinsk gas line), where imported equipment was used, met with a number of difficulties.

An examination of the technical documentation revealed some discrepancy between the working drawings and project specifications. For instance, the grounding of the equipment inside the electric-panel building, to the extent shown on the drawings, wasn't required since the plan provided for it to be installed on metal pilings made of pipes 300 mm in diameter sunk to a depth of 12 m and welded to frames. Electric panels were attached to them by means of bolts. The frames were welded directly to the external grounding circuit of the electric-panel building.

A number of additional operations not covered by the plan had to be undertaken at the same time. The added electrical work amounted to 126,000 rubles.

The operational assistance of the Kiev Planning Institute was effective.

The power and control cables were installed with special connectors.which also served as fasteners to connect to the panel, as a ground for the metallic covering and as an airtight cable lead-in.

The connector design is a fortunate one. However, their utility was impaired due to the lack of a tool for stripping and connecting the cables. A tool had to be made in the Administration shops.

The terminals on the Ye-17 panel and the panels of the supply units and the high-voltage cell control cables didn't match the cross-sections of the cables to be connected to them.

The ground panels had 30-50% fewer holes than the number of cables to be connected at the motor control points, on the Ye-9 master panel, on the Ye-17 panel and on the reserve-generator-control monitoring panel.

Additional holes were drilled in place; holes over 30 mm in diameter were made with an oxyacetylene torch, for which purpose some panels had to be dismounted.

In some of the airtight boxes (10% of the total number), which were to be installed in the buildings housing gas pumping units, additional holes were drilled and threaded to take the cable connectors. In a like number of the boxes the hole diameters didn't match the sizes of the connectors which were to be used.

For the cable lead-ins to the tubular electric heaters used for oil heating, which are installed in the oil-handling unit of the gas pumping equipment, it was necessary to make up connecting sleeves threaded inside and outside.

There was no place provided on the oil-handling units for installation of the single-plug actuator buttons.

The cross section of the two cables feeding the turbo-units' electric generators (120 mm^2) exceeded the cross section of the connection terminals (25 mm^2), which complicated the installation of the cables and the mounting of the cable adapters.

The greatest difficulty had to do with packaging. The equipment, supplied by British firms, wasn't packaged according to the type of work intended for it. The electrical equipment often "fell" into the sanitary engineering equipment and control and measuring instruments manifests.

Neither the manifests nor the packing lists included Russian translations. All of this served to complicate the conduct of operations.

In order to complete the electrical installation work at the Yarkovskiy compressor station, a number of organizational measures were instituted to remedy the aforementioned deficiencies.

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FUELS AND RELATED EQUIPMENT

FORTIETH ANNIVERSARY OF GIPROTRUBOPROVOD

Moscow STROITEL'STVO TRUBOPROVODOV in Russian No 8, Aug 79 p 38

[Article by P. Ya. Gladkov, Giprotruboprovod: "Giprotruboprovod is 40 Years Old"]

[Text] The State Order of Labor Red Banner Institute for Planning Trunk Pipelines--Giprotruboprovod--this year celebrates its 40th anniversary. From 1939 to 1951 it functioned as a planning trust--Nefteprovodproyekt--but was then converted to a planning institute.

Giprotruboprovod, with its former affiliates in Kiev and Leningrad, is attributed a noteworthy role in the development of oil pipeline transport and the bulk oil facilities in our country.

The major pipeline systems and most of the existing network of trunk pipelines were built in accordance with its plans. During the first post-war five-year plans sections of the Trans-Siberian oil trunk pipeline were built, as were pipelines in the Volga region and in the central areas, including the Al'met'yevesk-Kuybyshev-Saratov, Al'mat'yevsk-Gor'kiy, Gor'kiy-Ryazan'-Moscow, Gor'kiy-Yaroslavl and many others. The plan for the "Druzhba" branched oil pipeline system deserves special mention.

Major pipelines for petroleum products, distribution, storage and maritime terminals were built under the institute's plans in various areas of the country.

In 1967, by Decree of the Presidium of the USSR Supreme Soviet, Giprotruboprovod was awarded the order of Labor Red Banner for successful achievement in developing the "Druzhba" oil pipeline plan and for major accomplishments in the planning of pipeline systems.

The intiative for widespread introduction of large-diameter pipes in pipeline construction and pump assemblies with high unit capacity, for the progressive technology of oil pumping on the "from-pump-to-pump" system, and for automating the operation of oil pumping stations belongs to the people of Giprotruboprovod.

The systematic technical-economic elaborations on the prospects for development of a network of pipelines were of substantial value for the rational planning of capital investments in this field of construction.

At the outset of the development of tne oil deposits of Western Siberia, a vital assignment was given to the institute--the planning of the needed pipelines to get the oil out of that region. The fulfillment of that task called for special planning decisions governed by the complex natural geography of the construction areas, and the accomplishment of large amounts of exploratory and planning work.

In accordance with the Giprotruboprovod plans, the construction of pipelines originating in Western Siberia and totaling some 6800 km in length was accomplished; i.e., Shaim-Tyumen', Ust'-Balyk - Omsk, Ust'-Balyk - Nizhnevartovsk, Aleksandrovskoye - Anzhero-Sudzhensk, Ust'-Balyk - Kurgan - Ufa - Al'met'yevsk and Nizhnevartovsk-Kuybyshev.

At the present time, in accordance with the technical plan and working drawings of the institute and its Tyumen' and Tomsk affiliates, the Surgut-Polotsk pipeline is being built. The institute is taking part in construction of the first ammonia pipeline in the country, Tol'yatti-Odessa (they planned the line proper).

The institute's activity includes the development of capabilities in the field of pipeline planning. Its former Kiev affiliate became the independent institute Yuzhgiprotruboprovod [State Institute for Planning Trunk Pipelines in the South], which was the basis for forming the two institutes Yuzhgipronefteprovod [State Institute for Planning Oil Pipelines in the South] and Soyuzgazproyekt [All-Union Institute for Planning Gas Pipelines (?)]. During the Ninth Five-Year Plan, Giprotruboprovod affiliates were established in Tyumen' and Tomsk, and they have become active arms of the institute.

Giprotruboprovod has long-standing and strong connections with the Ministry of Construction of Petroleum and Gas Industry Enterprises, and with its scientific research organizations. In collaboration with them, the planners are finding new technical solutions aimed at upgrading construction quality and the reliability of oil pipelines, and are making a worthy contribution to the further development of pipeline transport.

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FUELS AND RELATED EQUIPMENT

PROMISES, PROMISES BUT NO GAS PIPELINE FOR TETS-21

Moscow MOSKOVSKAYA PRAVDA in Russian 27 Nov 79 p 2

[Article: "Tired of Promising..."]

[Text] "Promises But No Building" was the title of the letter from the chairman of the people's control group of TETs-21 V. Solntsev with editorial commentary published in MOSKOVSKAYA PRAVDA on 25 October 1979. This was the second address of the newspaper to the question of the excessively prolonged construction of the high pressure gas pipeline for central heating and power plant No 21.

The question of the interruption in the schedules for putting into operation of this gas pipeline that is important for the normal heat supply to a number of regions of the capital was examined in August of this year at the meeting of the Moscow City Office of People's Control. Then the representatives of Glavtruboprovodstroy [Main Administration for Construction of Oil Pipelines and Pipelines] of the Ministry of Construction of Petroleum and Gas Industry Enterprises verified that the last period for completion of the gas pipeline had been defined, 1 October 1979. But at the specified time it was found that this, like many previous schedules had been interrupted. The fact of nonfulfillment of the commitments is confirmed by the deputy minister for construction of petroleum and gas industry enterprises K. Smirnov whose signature is on the response to the publication "Promises But No Building" received by the editorial staff.

"The Ministry of Construction of Petroleum and Gas Industry Enterprises has examined in detail the state of construction of the gas pipeline from the KRP [control and distributing point] to GRS [gas distributing station] TETs-21, and reports that the course of construction of the gas pipeline has been examined by Glavtruboprovodstroy and the trust "Soyuzgazspetsstroy" at the site, additional equipment and workers have been sent to the facility, and measures have been taken to intensify the work.

At present the laying of the pipeline has been completed and blast cleaning carried out. The chief engineer of the trust "Soyuzgazspetsstroy" N. Vayler has been assigned to the facility. The ministry has taken the gas pipeline construction under special control."

In the letter of the Ministry of Construction of Petroleum and Gas Industry Enterprises all is correct in form and the periods for answering the criticism of the newspaper have been maintained. But in essence?

From the letter of the Ministry of Construction of Petroleum and Gas Industry Enterprises, first of all, it is not clear when nevertheless the gas pipeline that is very necessary for our city will actually be put into operation. As is apparent from the letter published above, the ministry prefers not to talk about this. One can of course understand such caution; enough promises have been made since 1975, and possibly they are tired of promises. Understandable but not justifiable.

Secondly, the official response of the ministry does not evaluate the numerous interruptions in the space of many years in the schedule for gas pipeline construction, and there is no mention of the responsibility of the leaders from the trust "Soyuzgazspetsstroy" and the specialized administration No 7 of A. Fomin and L. Sarkisyan for the nonfulfillment of the state plan. They are the ones who did not draw the proper conclusions from the decree of the office of the MGK CPSU and the Mossovet [Moscow City Soviet of Workers' Deputies] ispolkom "On Results of Work of the Construction, Transportation and Municipal Economy Industry under Conditions of Last Winter and Tasks for Preparation of the City for the 1979-1980 Winter."

We hope that the Ministry of Construction of Petroleum and Gas Industry Enterprises will be able once again to turn to the criticism of MOSKOVSKAYA PRAVDA on the question that is urgent for the city and will jointly with the ministry party committee inform the editorial staff specifically the measures taken and the periods for putting into operation the gas pipeline for the TETs-21.

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SHORTCOMINGS IN SURGUT-POLOTSK PIPELINE CONSTRUCTION

Delays in Perm'-Gor'kiy Section

Moscow STROITEL'NAYA GAZETA in Russian 25 Nov 79 p 1

[Article by Yu. Kuz'mina, correspondent of press center of Minneftegazstroy]

[Text] The pipeline Surgut-Polotsk has been arbitrarily divided into several stages. According to the plan the first of them, from Surgut to Perm' should be completed in the first 6 months, and the second, the central from Perm' to Gor'kiy, in the fourth quarter.

On 20 November the builders of this oil pipeline stretching 818 kilometers had welded 726 kilometers of pipes, laid 675 kilometers in the trench, insulated 604 kilometers and tested 170 kilometers.

The sections of the trust Soyuzpodvodgazstroy won a labor victory: almost a 1.5-kilometer path had been successfully traversed through the Volga.

The laying of the inverted siphon took place in a difficult situation. Here, below Gor'kiy, the river current is rapid, moreover by this time freeze-up had started. The layer of ice ripped up by the hydraulic dredges was turned into a continuous chopped mass. But the builders carried out the operation precisely. With the help of a powerful winch they dragged across the river four multiple-meter lengths, welded them, and placed them accurately in the trench on the bottom of the Volga.

The divers labored selflessly. M. Shuranov, as well as machine operator of the hydraulic dredge V. Gerasimov, brigade foreman of the complex brigade N. Fadeyev, and bulldozer operator V. Utkin especially distinguished themselves.

The collectives of the trusts Glavyuzhtruboprovodstroy, Soyuzgazpromstroy and others, competing for the worthy meeting of the 110th anniversary of the birthday of V. I. Lenin, strive to accelerate the putting into operation

of the central section of the oil pipeline. The surveyors have to overcome swamps, ravines and rivers. But nevertheless there are all the conditions for increase in the rates of work, first of all in the insulation-laying columns. The welders have prepared a broad front but the gap between them and the insulators is 120 kilometers. The sections of the trust Vostoktruboprovodstroy first of all should tighten up. Due to the lack of readiness of the heavy equipment the insulation work here has actually stopped. Currently the daily pace of insulating and laying on the whole on the route is somewhat greater than 8 kilometers. This is not sufficient to overcome the formed gap and to complete the central section of the most important trunk line before the end of the year.

Omissions on Surgut-Perm' Section

Moscow STROITEL'NAYA GAZETA in Russian 25 Nov 79 p 1

[Article by V. Avtonomov, our correspondent]

> [Text] But it is not only necessary to increase the rates of work of the insulation-laying columns in the construction of the oil pipeline from Gor'kiy to Perm'. It is also necessary to consider the lessons of the construction of the first phase, from Surgut to Perm' where due to omissions its putting into operation has been delayed.
>
> The oil workers are waiting for all the sections of the oil pipeline Surgut-Polotsk to be put into operation opportunely, with high quality and with omissions!
>
> The Tyumen' oil arrived in Perm' in the summer. But the state commission has not yet accepted this pipeline for operation because the organizations of the Minneftegazstroy [Ministry of Construction of Petroleum and Oil Industry Enterprises] have left significant omissions which up until now have not been eliminated.

As noted at a recent selector meeting (it was held by the deputy head of the Glavtransneft' [Main Administration for Transportation and Deliveries of Oil] of the USSR Ministry of the Petroleum Industry, chairman of the state commission V. Galyuk) of the 975 kilometers along the route power transmission lines only 80 have been connected, and not 1 of the 7 fire-fighting structures is ready. The helicopter pads have not been put into operation although a large portion of them are mainly ready. On individual segments additional burying of the pipes with soil is required. It is not easy to carry out all of this work.

Omissions have occurred first of all due to the absence of precise interaction of the cooperating workers, disruption in the construction technology

as well as defects in the fulfillment of the welding operations. Thus, the crossings over the rivers Kondinka, Sylva, Voronovka, Kuna and certain others in the Tyumen'skaya oblast were made with deviation from the project. At times instead of laying simultaneously two branches of the pipeline during the crossing of the rivers, one was laid while the second was left "for later."

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FUELS AND RELATED EQUIPMENT

BRIEFS

DEPUTY MINISTER OF GAS INDUSTRY--The USSR Council of Ministers decrees that Comrade T. G. Vekilov be appointed deputy minister of the gas industry. Signed by Chairman of the USSR Council of Ministers A. Kosygin and Administrator of Affairs of the USSR Council of Ministers M. Smirtyukov [Text] [Moscow SOBRANIYE POSTANOVLENIY PRAVITEL'STVA SOYUZA SOVETSKIKH SOTSIALISTICHESKIKH RESPUBLIK in Russian No 24, 1979 p 565] 9035

OIL DRILLING--Saatly--Successful drilling is underway of a well planned for a depth of 15,000 meters by the toilers of the Saatly oil exploration expedition of superdeep drilling. Its face has already reached a depth of 5,353 meters, and now drilling is underway with continuous recover of rock samples with the help of core tools of the latest designs. The use of so-called false-column also helps to achieve success: a unique protector that prevents premature wear of the pipes at great depths. Its experimental use by the Azerbaijan prospectors was adopted from the toilers of the expedition that is drilling the same well on the Kola Peninsula. [Excerpt] Baku VYSHKA in Russian 6 Dec 79 p 1] 9035

METAL MELTING--Novokuznetsk, Kemerovskaya oblast, 7 Dec--The traditional melting of friendship took place at the open-hearth furnace No 14 of the V. I. Lenin Kuznetsk kombinat. The steel workers dedicated it to the half-century anniversary of creative concord of the collectives of Magnitka and Kuzbass. For already half a century the metal of Magnitka has been melted on Kuznetsk coke. And quite recently when the Kuznetsk kombinat began to use natural gas the specialists of the Urals helped their friends to master the new technology. In the competition of the collectives of the Urals and Kuzbass the Nizhne-Tagil kombinat and Zapsib are participating. [Text] Moscow PRAVDA in Russian 8 Dec 79 p 1] 9035

DRILLING UNITS--Volgograd--New drilling units of universal assembly capability will significantly facilitate the path to oil and gas deposits. The first platforms with this equipment were sent by the collective of the production association "Barrikady" to the tunnelers of the Tyumen' depths. The new unit will permit a 25-30% reduction in the well construction period. During tunneling of the shafts a considerable percentage of the time and labor is spent on assembly of the borehole. The new equipment will exclude labor-intensive work, for assembly of the most complicated devices, assemblies and aggregates is carried out in the shops of the association. [Text] [Moscow SEL'SKAYA ZHIZN' in Russian 6 Dec 79 p 1] 9035

COMPUTER QUALITY CONTROL--Yaroslavl'--For quality control of products at the Novo-Yaroslavl', as well as at the other oil refineries of the country so-called gas chromatographs are used. In order to determine with their help the quality of the raw material or the finished petroleum products the laboratory workers need up to 30 minutes. For accelerated calculation of chromatograms in the central laboratory of the Novo-Yaroslavl' plant a computer has been successfully introduced. With its use the period of analysis was reduced to 20-30 seconds. As a result there was a sharp rise in the labor productivity of the laboratory workers, and due to the liberation of their working time it became possible to put yet another production unit of the plant under laboratory control. [Text] [Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 21 Nov 79 p 2] 9035

LITHUANIAN OIL REFINERY--Mazheykyay, Lithuanian SSR--Set-up of equipment has started at the Mazheykyay oil refinery, the first of the Lithuanian petrochemistry. On an enormous platform silver columns have been raised of the rectifiers where the oil is converted into high octane gasoline, diesel fuel, and lubricants. The water treatment plants are completely ready and a system of gas-steam traps has been built; they will reliably protect the environment from pollution. Oil is already flowing on the pipeline Polotsk-Mazheykyay. The small city of Mazheykyay which is becoming a city of petrochemists and builders is growing together with the plant. [Text] [Moscow IZVESTIYA in Russian 9 Dec 79 p 3] 9035

URENGOY GAS--Tyumen'--The supply of northern gas to the industrial centers of the European sector of the country and to the Urals has grown. At the Urengoy field which is located at the very polar circle a powerful unit for complex gas preparation has been put into operation. It is capable of daily purifying from different admixtures and sending to the main pipelines tens of millions of cubic meters of gas. Now there are already three such plants operating at the new field. [Text] [Moscow EKONOMICHESKAYA GAZETA in Russian No 48, Nov 79 p 5] 9035

KOMI PIPELINE--Syktyvkar, Komi ASSR--A new pipeline has delivered gas of the Vuktyl field to the capital of the autonomous republic. An important step has been taken in the complex development of the natural resources of the north. On the outskirts of Syktyvkar a large industrial center of the Timano-Pechora territorial-production complex is being created. Here several enterprises and residences are being built. These objects were the first to be connected to the gas pipeline. [Text] [Moscow EKONOMICHESKAYA GAZETA in Russian No 48, Nov 79 p 5] 9035

GAS-PUMPING UNIT--Leningrad--The country's largest gas-pumping unit for the main pipelines with power of 25,000 kilowatts was engaged at one of the compressor stations of the production association "Lentransgaz." The more than double increase in the power of the units will increase the efficiency of gas transporting over great distances. [Text] [Moscow EKONOMICHESKAYA GAZETA in Russian No 48, Nov 79 p 5] 9035

OIL MIXTURE--Kuybyshev (TASS)--A reduction in the sulfur content in the oil extracted at the fields of the Volga region will permit an increase in the service life of the oil refinery equipment. Now it will be mixed with the low-sulfur oil coming from Siberia. For this a special complex has been created whose first phase was put into operation yesterday. The mixture will flow on the oil pipelines to the enterprises of the Soviet Union and countries of socialist cooperation. [Text] [Moscow MOSKOVSKAYA PRAVDA in Russian 24 Nov 79 p 1] 9035

CHEMICAL REAGENT--Kazan'--Large-capacity production was put into operation in the Kazan' association "Organicheskiy sintez." Yesterday the oil workers of Tataria were sent the first tanks with the chemical reagent manufactured here. It makes it possible to rapidly purify the oil of water and other admixtures, and considerably improve the quality of the petrochemical raw material. [Text] [Moscow MOSKOVSKAYA PRAVDA in Russian 16 Nov 79 p 1] 9035

GAS COOLING STATION--Construction has begun on the natural gas cooling station on the pipeline Urengoy-Nadym. Usually the gas enters the main pipeline with a plus temperature. This results in breakdown of the layer of permafrost on the route of the gas pipeline, and damages the woundable tundra soil. There is also another danger: deformation of the steel pipe in the swampy ground formed at the site of the melted frost. For this a gas cooling station was required. The station project was worked out by the scientists of the Leningrad institute Giprospetsgaz. [Text] [Moscow STROITEL'NAYA GAZETA in Russian 18 Nov 79 p 3] 9035

UNDERGROUND COAL FIRE--Orenburg--The motor of the powerful bulldozer roared and the driver Aleksey Biryukov directed the machine into a wide trench where the cracks and dips smoked with with a dove-colored smoke and at times tongues of flame escaped from them. Already for a long time on individual sectors of the Tyul'gan field, somewhere deep in the depths an underground fire has been slowly devouring the brown coal. There have been many attempts to extinguish the fire, for if it suddenly emerged on the surface it could do great harm to people and equipment. The builders have unfolded at this field extensive work and are hurrying to put the open pit into operation. There is a lot of brown coal here, annually millions of tons of it will be extracted. The work should be accelerated but the underground fire has interfered with the work. Machine operator A. Biryukov has started to extinguish the fire by a simple method: he decided to tightly bury all the cracks and gaps with rock. This hot work lasted for a long time, but then the result was comforting: when all the cavities in the earth from which the smoke emerged and the flame escaped were thoroughly buried and tamped, above the trench it became light, and the smoke haze disappeared. Oxygen ceased to enter into the deep gaps, and with time the combustion of coal stopped. The Orenburg oblast newspaper YUZHNYY URAL relates this duel between man and an underground fire to the readers. [Text] [Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 22 Nov 79 p 4] 9035

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